

Response to 35 U.S.C. § 103 Rejection

US Patent No. 2,940,921 fails to teach the current invention

Applicant respectfully submits that claims 1, 3-6, 9, 11, 12, 17, 18, 19, 23, and 24 are not obvious over U.S. Patent No. 2,940,921 (Malloy). Applicant respectfully submits that the claims contain material elements that are missing in the Malloy patent and that it would not be obvious to add or alter the elements of Malloy to create a more efficient process of the current invention.

Examiner's First Argument

The Examiner identifies Applicant's first argument to be that Malloy separates out the paraffin fraction while the present invention treats the paraffin fraction and the Examiner argues that that Malloy does treat the paraffin fraction. In response to this, Applicant respectfully submits that after the first reactor, which is run at temperatures below cracking, Malloy fractionates the products and removes the paraffins (Malloy, Col 1, 1.59-60). The paraffins are removed from the fractionator 25 through line 29 and sent directly to the reformat without any further reactor processing. The current invention instead removes the aromatics, addresses the paraffins by processing them multiple times, and completes the reaction to produce higher quality product.

As noted in prior correspondence, in Malloy, reforming processes (in Malloy's case, fixed bed reforming) for reforming naphthas are faced with three general categories of components which respond differently to the reforming process. Malloy identifies the groups as: (1) C4- group; (2) C5 and C6 hydrocarbons, which are paraffins (Malloy, Col. 1, l. 18); and (3) C7+ group. Malloy suggests that these defined component groups be handled selectively. To that end,

Malloy teaches running a full range naphtha feed stock through a first reactor in a series of reactors. [Malloy, Col. 1, l. 55]. After the first reactor, which is run at temperatures below cracking, Malloy fractionates the products and removes the paraffins. Malloy does this because paraffins are difficult to process and are problematic at higher temperatures. Thus, Malloy separates out the paraffins and runs the remaining fractions at higher temperatures.

In contrast, the current invention recognizes the same problem, namely, that different components react in different ways, but the current invention treats each fraction thereby producing a more efficient and superior product slate. In claims 1 and 19, it is shown that the reaction products after reaction in the first stage, shown as a non-traditional CCR Platform reformer, is subjected to separation. It is recognized that the lighter naphthenes will respond most quickly to treatment, by converting to aromatics, while the other components require further processing. (Specification, para [0005]) Claim 1 and 19 separate the treated naphthenes (now aromatics) out of the stream leaving the first reactor before sending the remainder of the stream as feed to the second stage of the reformer. In this manner, the aromatics will not be subjected to further processing that could create an inferior process. Similarly, the aromatics being removed provides a feed volume that is reduced and that allows treatment of the remaining fractions without regard to aromatics. The hard to convert hydrocarbons continue to be processed creating a superior product. Thus, while Malloy and the current invention recognize the same problem, the inventions address the problem in very different manners. While Malloy removes the hard-to-handle component, the paraffins, and continues with the reforming process, the current invention instead removes the aromatics, addresses the paraffins and completes the reaction to produce higher quality product.

Examiner's Second Argument

The Examiner identifies Applicant's second argument to be that the invention combines of the first and second liquid stream and immediately sends the combined stream to the reformat pool and the Examiner argues in return that the references fail to show certain features of applicant's invention. Applicant has amended Claims 1 and 19 to require that the invention includes combining and cooling the first and second liquid streams and sending the first and second liquid streams directly to a reformat pool. The combined first liquid stream and second liquid stream will undergoes no additional reactors or equilibrium separators that would modify the composition of the stream (Specification, paras [0013] and [0014]).

As noted in previous correspondence, the examiner points out that, the C7+ fractions of Malloy are combined and ultimately arrive at a reformat pool, however this is only after the C7+ is combined with the C4- fraction and has undergone significant treatment (see col. 2 line 61 – col. 3 line 17). In contrast, as discussed above, amended claim 1 and 19 of the current application claims that the first liquid stream and second liquid stream are combined then cooled and immediately sent to a reformat pool. By removing the liquid, the product sent to the next reactor in the current application will have a lower concentration of both aromatics and of the naphthenes that were converted to aromatics. This changes the equilibrium of the product entering the reactor and enhances the driving force for the formation of aromatics. In addition, because most, if not all, of the naphthenes have been depleted in the first reactor, the remaining processes can be more specifically tailored to converting the more difficult paraffins.

Therefore, while Malloy and the current application address the same problem, the Malloy patent fails to teach the improved method of the current independent claims 1 and 19. Naphtha

reforming produces high octane gasoline and aromatics in the petrochemical industry. The amount of benzene in aromatics as gasoline is carefully controlled in the world. Therefore, improvements in efficiency in this process can translate to substantial economic incentives. The current invention addresses a long felt need to create a higher quality product efficiently.

The Federal Circuit noted in *In re Fritch* that:

Under Section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so. Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. (emphasis original) 23 U.S.P.Q. 2d 1780, 1784 (Fed. Cir. 1992).

Malloy does not suggest any motivation or desire to modify the elements to accomplish Applicant's present invention. On the contrary, Malloy teaches away from the current invention by separating the paraffins to avoid processing them. The invention as claimed in independent claims 1 and 19 and the claims that depend therefrom are thus nonobvious.

Examiner's Third Argument

The Examiner identifies Applicant's third argument to be that there is no motivation to add the invention of U.S. Patent No. 5,890,378 (Rambo) with the invention of Malloy. Applicant respectfully submits that Rambo is non-analogous art in that it is a gas separation plant. Rambo is disparate art in a different class of invention. Rambo does not have any reaction processes but is instead simply separates the components of a gas stream by condensation. One of ordinary skill in the art would not look to the field of gas separation when addressing a need in naphtha reforming. As such, there is no motivation or suggestion to combine the art.

Applicant respectfully reiterates that claims are distinguishable from Malloy in view of Rambo. The elements missing from Malloy are not supplied by Rambo. Furthermore, Applicant would note that Rambo is non-analogous art in that it is a gas separation plant. Rambo teaches the separation of light hydrocarbons, while the current invention is directed toward naphtha reforming. The art of separation through the use of a demethanizer or a deethanizer is disparate from the art of reforming straight chain alkanes into reformed molecules. One of ordinary skill in the art would not look to the field of gas separation when addressing a need in naphtha reforming. As such, there is no motivation or suggestion to combine the art.

Examiner's Fourth Argument

The Examiner identifies Applicant's fourth argument to be that U.S. Patent No. 4,401,554 (Choi) discloses splitting the hydrogen feed to the first and third reactor while the current invention splits the hydrocarbon feed and the Examiner argues that Choi discloses splitting the hydrocarbon feed to the first and third reactor. Applicant respectfully submits that although the description is vague, Choi does not split the hydrocarbon feed to the first and third reactor. Figure one and col 5, lines 48-62 appear to teach the combination of the light stream 26 and the effluent from the second reactor in line 22b and convey this combined stream to the third furnace 16c. The light stream 6 is not simply split from naphtha feed 2. Naphtha feed 2 is separated into two components, a light stream 6 and a heavy stream 8. Separating involves separating various components of the feed. Splitting is the process whereby the two resulting streams have the same composition as the feeding stream. In the present invention the hydrocarbon stream is split prior to any separation.

As noted in previous correspondence, applicant respectfully submits that claims 10, 14, 21 and 22 are not obvious over Malloy in view of Choi. As noted above, Malloy is missing elements of the current invention in the independent claims, which also form limitations of these dependent claims. Choi does not provide the missing limitations. Choi discloses that a hydrogen stream used in the processing of the naphtha is split with a portion fed to the first reactor and the other portion fed to the third for the purpose of reducing the average partial pressure. In the present application, it is the hydrocarbon feed that is being split for the purpose of increasing the amount of feed being delivered to the second or third reactor, as appropriate. One of ordinary skill in the art would not look to the steps taken with the stream of hydrogen when addressing the need to control hydrocarbon feed to successive reactors in a reforming process. As such, there is no motivation or suggestion to combine the art.

In commenting upon the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between the references and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the prior art and Applicant's present invention have been made by Applicant. For the foregoing reasons, Applicant reserves the right to submit additional evidence showing the distinctions between Applicant's invention to be unobvious in view of the prior art.

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be

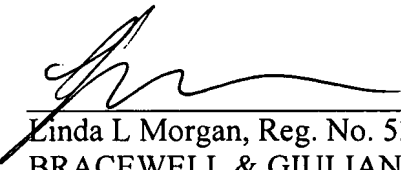
considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that Applicant's attorney chooses to mention at this time.

Reconsideration of the application and allowance of all of the claims are respectfully requested. In view of the foregoing Response, Applicant respectfully submits that all of the claims are allowable, and Applicant respectfully requests the issuance of a Notice of Allowance. Should further discussion regarding the application be desired by the Examiner, a telephone conference is respectfully requested. Constance Gall Rhebergen can be reached at (713) 221-3306.

In the event the fee is deemed insufficient, the Commissioner is authorized to charge
BRACEWELL & GIULIANI LLP, Deposit Account 50-0259 (4159.3005) in the amount of any
deficiency.

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Respectfully submitted,



Linda L Morgan, Reg. No. 53,347
BRACEWELL & GIULIANI LLP
P.O. Box 61389
Houston, Texas 77208-1389
(713) 221-1482 direct phone
(713) 221-2123 direct facsimile
Linda.Morgan@BracewellGiuliani.com

Attorney for Applicant